UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/675,286 | 09/29/2000 | Ganapati Srinivasa | 42390P9663 | 1265 |

7590 08/25/2004

Blakely Sokoloff Taylor & Zafman LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025

| EXAMINER | |
|---|---|
| ALI, SYED J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2127 | |

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/675,286 | SRINIVASA ET AL. | |
| | Examiner | Art Unit | |
| | Syed J Ali | 2127 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *04 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This office action is in response to the amendment filed June 4, 2004. Claims 1-20 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

### *Claim Rejections - 35 USC § 103*

3. **Claims 1-2, 5-7, 9-13, 15-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (USPN 5,739,820) in view of Krum (USPN 6,539,445) in view of Shaw et al. (USPN 6,362,836) (hereinafter Shaw).**

4. As per claim 1, Lyon teaches the invention as claimed, including a method comprising:

creating a scaled-down representation of input to a compute-intensive application (col. 1 lines 41-50).

5. Krum teaches the invention as claimed, including the following limitations not shown by Lyon:

calculating a computing requirement based on the scaled-down representation (col. 7 line 18 - col. 8 line 24); and

calculating a turn-around time to run the compute-intensive application with the input, on one or more processors, based on the calculated computing requirement (col. 7 line 18 - col. 8 line 24).

6. Shaw teaches the invention as claimed, including the following limitations not shown by Lyon or Krum:

calculating an actual cost to a customer to run an application (col. 17 line 31 - col. 18 line 37) and sending the turn-around time and cost to a customer's client software (col. 7 lines 26-36).

7. It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw since Lyon teaches including an efficient system for reducing in complexity a computationally intensive operation, yet fails to indicate how the scaled down representation would translate into an actual reduction in execution time. This drawback is of great import since current graphics processing can require very high computational demands, such that knowing the benefit gained from a reduction in that load could permit a client to determine whether it is more efficient to do the processing itself, or to submit the work to a farm. Krum accounts for this deficiency by taking input from a client and determining the additional processing load that the input would require, as well as the execution time required to complete the processing. By taking into account both the system's current processing load such that the start time of the processing can be determined, as well as the estimated execution time, Krum can reasonably estimate the completion time for the processing. It would have been obvious to one of ordinary skill in the art to add Shaw to the combination of Lyon and Krum since Lyon, as modified by Krum, provides a method of estimating a computation time associated with a simplified representation of an application at a CPU farm, yet fails to calculate a cost associated with processing the application or relaying information pertaining to the execution time and costs to a user issuing the requests. Shaw makes up for this deficiency by calculating

the cost required with a graphics operation, as well as establishing a line of communication between a client and a server so that information relating to an issued request is available. This would allow a client to determine if submitting a job is cost-effective and time-effective.

8. As per claim 2, Lyon teaches the invention as claimed, including the method of claim 1 wherein the compute-intensive application is to perform computer graphics rendering (col. 1 lines 41-50).

9. As per claim 5, "Official Notice" is taken that it would have been obvious to one of ordinary skill in the art that the scaled-down representation of the application input includes the geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-aliasing, and motion-blur of an underlying scene. Lyon refers to a method of reducing the complexity associated with specular reflection, i.e., shading method. Although this corresponds to only one of the claimed aspects of a scene to be rendered, the remainder of the aspects of scene rendering are well known and expected in the art. That is, for graphics rendering, the claimed components are essential to the realistic portrayal of a scene, and the method of Lyon of approximating calculations without using square roots and powers is applicable to other types of rendering than shading. By reducing the calculation of normal vectors and other such calculations requiring square roots and powers, the overall computation requirement can be reduced. It would have been obvious to one of ordinary skill in the art to apply the computational technique to

other aspects of scene rendering such that the total computing requirement can be reduced, and not only that associated with the shading method.

10. As per claim 6, Shaw teaches the invention as claimed, including the method of claim 1 wherein the turn-around time and actual cost are transmitted over an internet to the customer's client software (col. 6 lines 48-62).

11. As per claim 7, Shaw teaches the invention as claimed, including the method of claim 1 wherein the cost is in terms of input units (col. 17 line 31 - col. 18 line 38).

12. As per claim 9, Shaw teaches the invention as claimed, including the method of claim 7 wherein the input units are image frames (col. 17 line 31 - col. 18 line 38).

13. As per claim 10, Lyon teaches the invention as claimed, including a system comprising:

an application-specific module to model input data (col. 1 lines 41-50).

14. Krum teaches the invention as claimed, including the following limitations not shown by Lyon:

a heuristic modeler module coupled to the output of the application-specific module, to calculate a computing requirement (col. 7 line 18 - col. 8 line 24); and

a run-time calculator module coupled to the output of the heuristic modeler module, to compute a turn-around time to run the application on one or more processors (col. 7 line 18 - col. 8 line 24).

15. Shaw teaches the invention as claimed, including the following limitations not shown by Lyon or Krum:

calculating an actual cost to run the application on one or more processors (col. 17 line 31 - col. 18 line 37).

16. As per claim 11, Shaw teaches the invention as claimed, including the system of claim 10 wherein the modules are to communicate with each other over an internet (col. 6 lines 48-62).

17. As per claim 12, "Official Notice" is taken that it would have been obvious to one of ordinary skill in the art that the scaled-down representation of the application input includes the geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-aliasing, and motion-blur of an underlying scene for reasons discussed above in reference to claim 5.

18. As per claim 13, Lyon teaches the invention as claimed, including an article of manufacture comprising:

a machine readable medium containing instructions which, when executed by a processor, cause a machine to perform operations comprising:

creating a scaled-down representation of input at a customer's machine (col. 1 lines 41-50).

19. Krum teaches the invention as claimed, including the following limitations not shown by Lyon:

calculating a computing requirement based on input having been created at a customer's machine (col. 7 line 18 - col. 8 line 24); and

calculating a turn-around time to run the compute-intensive application with the input, on one or more processors, based on the calculated computing requirement (col. 7 line 18 - col. 8 line 24).

20. Shaw teaches the invention as claimed, including the following limitations not shown by Lyon or Krum:

calculating an actual cost to the customer (col. 17 line 31 - col. 18 line 37); and

providing the turn-around time and the actual cost to the customer's client software (col. 7 lines 26-36).

21. As per claim 15, "Official Notice" is taken that it would have been obvious to one of ordinary skill in the art that the scaled-down representation of the application input includes the geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-aliasing, and motion-blur of an underlying scene for reasons discussed above in reference to claim 5.

22. As per claim 16, Shaw teaches the invention as claimed, including the article of manufacture of claim 13 wherein the medium includes further instructions to enable the scaled-down representation of the input to be received over an internet from the client software (col. 6 lines 48-62).

23. As per claim 17, Shaw teaches the invention as claimed, including the article of manufacture of claim 13 wherein the medium includes further instructions to enable the turn-around time and actual cost to be transmitted over the internet to the customer's client software (col. 6 lines 48-62).

24. As per claim 18, Shaw teaches the invention as claimed, including the article of manufacture of claim 13 wherein the medium includes further instructions to calculate the cost in terms of input units (col. 17 line 31 - col. 18 line 38).

25. As per claim 20, Shaw teaches the invention as claimed, including the article of manufacture of claim 18 wherein the medium includes further instructions to calculate the cost in terms of input units being image frames (col. 17 line 31 - col. 18 line 38).

26. **Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of Krum in view of Shaw in view of Burgun et al. (USPN 6,336,087) (hereinafter Burgun).**

27. As per claim 3, Burgun teaches the invention as claimed, including the following limitations not shown by Lyon, Krum, or Shaw:

the method of claim 1 wherein the compute-intensive application to be reduced in complexity is to perform logic simulation (col. 4 lines 30-34).

28. It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw with Burgun since logic simulations can often have a high degree of

complexity, especially for certain types of circuits such as shift registers and flip flops. Therefore, to reduce these circuits into as simple components as possible, the cost and overhead incurred with the circuits can be substantially reduced. This not only serves to reduce the computation time associated with the circuit, but also reduces the cost incurred with the circuit.

29. **Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of Krum in view of Shaw in view of Thyagarajan et al. (USPN 6,600,836) (hereinafter Thyagarajan).**

30. As per claim 4, Thyagarajan teaches the invention as claimed, including the following limitations not shown by Lyon, Krum, or Shaw:

the method of claim 1 wherein the scaled-down representation of the application input is generic to a class of applications (col. 5 lines 39-58).

31. It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw with Thyagarajan since the goal of reducing the complexity of an application is meant to achieve the result of a lower cost of processing as well as a faster computation and turn-around time. Since Lyon pertains mostly to a shading method, although it may have additional applications, the addition of Thyagarajan permits an image to be reduced in complexity overall. That is, the image being processed is applied against a compression technique that will improve the overall performance, and is not limited to a shading method, or other processing based on vectors and normalization, normally computationally intensive operations.

As per claim 14, Thyagarajan teaches the invention as claimed, including the article of manufacture of claim 13 wherein the medium includes further instructions to create the scaled-down representation of the application input as being generic to a class of applications (col. 5 lines 39-58).

32. **Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of Krum in view of Shaw in view of Agarwal (USPN 5,854,752).**

33. As per claim 8, Agarwal teaches the invention as claimed, including the following limitations not shown by Lyon, Krum, or Shaw:

the method of claim 7 wherein the input units that determine the cost are logic gates (Claim 13).

34. It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw with Agarwal since determining the cost of an application is most easily done by determining the breadth of an application. In the case of a logic simulation, the complexity is most closely related to the number of logic gates, i.e., the greater the number of logic gates associated with a function, the greater the complexity and thus, the higher the associated cost should be. Therefore, the addition of Agarwal to Lyon, Krum, and Shaw provides a satisfactory model of associating higher costs with higher complexity applications.

35. As per claim 19, Agarwal teaches the invention as claimed, including the article of manufacture of claim 18 wherein the medium includes further instructions to calculate the cost in terms of input units being logic gates (Claim 13).

***Response to Arguments***

36. Applicant's arguments filed June 4, 2004 have been fully considered but they are not persuasive.

37. Applicant argues on page 6, "*Unlike the present invention, which teaches a method for providing an accurate price quote to a customer, Lyon teaches '[a] method and system for approximating a Phong shading calculation for 3D renderings of realistic graphic images.'* Lyon, *Abstract. Referring to independent claim 1, Lyon does not teach or suggest Applicants' element of 'creating a scaled-down representation of input to a compute-intensive application.' In fact, Lyon does not teach or suggest a scaled-down representation of input. Instead, Lyon teaches the types of mathematical expressions that are used to approximate the new Phong shading calculation.*"

38. Examiner respectfully disagrees. The scaling down of input to reduce the computation requirements is specifically the issue that Lyon addresses (col. 1 lines 41-50, "The invention uses approximate normalization, vector differences, and polynomial shape functions to simplify processing"). Furthermore, Lyon teaches the improvement of the normalization technique, such that the shading methods may be subsequently improved. As one of ordinary skill in the art would be aware, the calculation of normal vectors is a primary calculation when it comes to 3-D rendering. The normal vectors are

used in the calculations of subsequent computations, in this case, Phong shading, Gouraud shading, specular reflection, etc. (col. 3 lines 44-65, "The parameters at the input of the calculator include a normal vector N 300, a light vector L 302, an eye vector 304, and a shininess coefficient n 306"). The reduction in complexity of these normal vectors, i.e. input to the shading calculators, allows for simplified computation and improvement in performance.

39. Applicant argues on page 7, "*Unlike the present invention, which discloses a method for providing an accurate price quote to the customer to run a compute-intensive application on a CPU farm (*See Specification, *page 2, line 30 - page 3, line 1; page 5, line 8 - page 6, line 34), Shaw appears to teach '[t]he cost of executing a display request on the client device' (*Shaw, *col. 17, line 32 - col. 18, line 37). Thus, instead of providing the cost for executing a compute-intensive application with the input on one or more processors [on a CPU farm], Shaw discloses the cost of executing a display request on the client device.*"

40. Examiner respectfully disagrees. In response to applicant's arguments against the Shaw reference individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Shaw is meant to build upon the teachings of Lyon and Krum, and it is not the position of the Examiner that Shaw teaches the cost to run a compute-intensive application on a CPU farm. Shaw is cited to show how an estimation for a computational cost can be generated for an application. The particular application,

or what changes are made to the application beforehand is not relevant to Shaw, as these features are shown by Lyon and Krum. Shaw teaches a cost estimation for various display or graphics operations, but does not provide an exhaustive list (col. 17 line 54 - col. 18 line 12, "Table 2 of Fig. 5 provides relative costs...of the various graphics operations. Table 2 does not provide costs for all of the AIP request display operations"). When considered in combination with Lyon, which teaches creating a scaled-down representation of input for a display or graphics operation, Table 2 of Fig. 5 of Shaw could reasonably be modified to include the cost of such an operation.

41. The remainder of the arguments presented rely upon the alleged deficiencies of Lyon and Shaw discussed above.

***Conclusion***

42. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (703) 305-8106. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (703) 305-9678. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
August 19, 2004

MENG-AI T. AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100